# NEW RECORD OF ODONATA (INSECTA) IN THE PLAIUL FAGULUI RESERVE, REPUBLIC OF MOLDOVA

**BUȘMACHIU Galina**

**Abstract.** The study of Odonata from the Plaiul Fagului Reserve allowed us to reveal four new species *Aeshna cyanea*, *Cordulia aenea*, *Isoaeschna isoceles* and *Sympecma fusca* recorded during spring-summer of 2024. The species *Aeshna cyanea* is the 47th species, the presence of which is confirmed in the Republic of Moldova. In the Plaiul Fagului Reserve two protected species *Anax imperator* and *Leucorrhinia pectoralis* included in the 3th edition of the Red Book (2015) are identified, the reserve being considered as a model of efficient management of natural ecosystems in our country.

**Keywords:** Odonata, new record, forest reserve, rare species, distribution, ecology.

**Rezumat. Noi semnalări ale odonatelor (Insecta) din Rezervația Plaiul Fagului, Republica Moldova.** Studiul Odonatelor în primăvara-vara anului 2024 în Rezervația Plaiul Fagului a permis identificarea a patru specii noi pentru rezervație: *Aeshna cyanea*, *Cordulia aenea*, *Isoaeschna isoceles* și *Sympecma fusca*. Specia *Aeshna cyanea* este a 47-a specie, a cărei prezență este confirmată în Republica Moldova. În Rezervația Plaiul Fagului sunt prezente două specii *Anax imperator* și *Leucorrhinia pectoralis*, incluse în ediția a 3-a a Cărții Roșii (2015), rezervația fiind considerată ca un model de management eficient al ecosistemelor naturale din țara noastră.

**Cuvinte cheie:** Odonata, date noi, rezervație forestiera, specii rare, distribuție, ecologie.

## INTRODUCTION

The Plaiul Fagului Reserve (47°29'43"N 28°2'69"E) is located in the north-western part of the Central Codri Plateau, 70 km from the Chișinău city. The territory of this reserve is crossed by several small streams, one of which is Rădeni River. On the territory of the reserve there are four large ponds, as well as several small, that dry up periodically (Fig. 1).

The biodiversity of invertebrates in this reserve is one of the best studied compared to other protected areas in the Republic of Moldova. Recently, the monograph dedicated to the study of invertebrates in the Plaiul Fagului Reserve was published, which included 1011 species from two classes Collembola and Insecta with orders Odonata, Hemiptera, Coleoptera, Lepidoptera, Hymenoptera and Diptera (BUȘMACHIU et al., 2021). Plaiul Fagului is the only reserve where the diversity of Odonata has been studied since 2003, and from 2020 the researches are carried out regularly from spring to autumn of every year and published in several works (MUNJIU & BUȘMACHIU, 2023; GROZDEVA et al., 2023).

In the chapter Odonata published in 2021, 21 species of dragonflies are cited for the Plaiul Fagului Reserve, based on our own research and bibliographic sources, which belong to 12 genera and 6 families (BUȘMACHIU, 2021). Following investigations carried out in the 2022-2023 years, the list of species was completed with newly identified species. According to the latest studies carried out in the Plaiul Fagului Reserve, 26 species of dragonflies were identified, which belong to 16 genera and 6 families (MUNJIU & BUȘMACHIU, 2023; GROZDEVA et al., 2023).

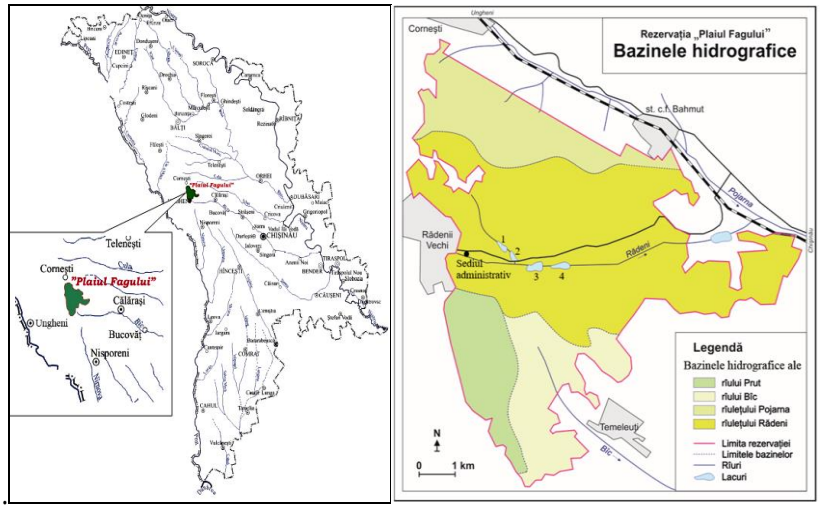



Figure 1. Map of Plaiul Fagului Reserve (MUNJIU & BUȘMACHIU, 2023).

## MATERIAL AND METHODS

Adults (males, females or tandem) were collected during April-October 2024 in the swamp vegetation of ponds 1-4 located in the meadow of the Rădeni river. Alternatively, some individuals were photographed in their natural habitats, during sunny or cloudy days, with an air temperature above 20°C. Collected adult specimens were mounted and stored in the collection of the Museum of Entomology, Institute of Zoology, MSU in Chișinău. Some exuviae were also collected from vegetations of the ponds during spring.

The study was caried out twice a month on four ponds located along the Rădenii river and two other temporary ponds that periodically dry up which numbered as No.5 and No.6. The richest in Odonata species turned out to be pond no. 2, which has an area of 3.2 ha and is abundantly covered with vegetation (Fig. 2).



Figure 2. Pond No. 2. General view (photo Bușmachiu G.).



Figure 3. Small pond No. 5 in the forest (photo Bușmachiu G.).

One of two small temporary ponds located in the forest was also investigated. A journey was made on the tourist route in the forest area in July 2024 and in the middle of the route, a small pond No.5 filled with spring water was observed. The pond is located (47°17'N 28°01'E) near fountain at an altitude of 300 meters in plot number 37 I of the Plaiul Fagului Reserve (Fig. 3). It is a slope with northern exposure with the predominance of 50-year-old oak in the arboretum structure. Another temporary pond No. 6 is located on the edge of the strictly protected area, plot number 37 (47°18'N 28°05'E) and is formed from spring water, the pond often dries up in summer due to droughts in recent years.

## RESULTS AND DISCUSSION

As a result of investigation carried out during 2024 year in the Plaiul Fagului Reserve four new species of Odonata: *Aeshna cyanea* (Müller, 1764), *Cordulia aenea* (Linnaeus, 1758) (Fig. 4) and *Isoaeschna isoceles* (Müller, 1767) (Fig. 5) and *Sympecma fusca* (Vander Linden, 1820) were revealed. The species *Aeshna cyanea* is the 47$^{th}$ species, the presence of which is confirmed in the Republic of Moldova.



Figure 4. *Cordulia aenea* (photo Bușmachiu G.).



Figure 5. *Isoaeschna isoceles* (photo Bușmachiu G.).



Figure 6. *Aeshna mixta* (photo Bușmachiu G.).



Figure 7. *Aeshna affinis* (photo Bușmachiu G.).

Two males adults of *Aeshna cyanea* (Müller, 1764) were observed during the journey on the tourist route on July 24, 2024 flying over a small pond No.5 in the forest of the Plaiul Fagului Reserve (Fig. 3). The species is firstly observed and cited with the place of collection and the number of individuals observed in the Republic of Moldova. According to European database this dragonfly species mainly inhabits well-vegetated small ponds. The species is common and most widespread in Europe. In the IUCN Red List Category (Europe) the species is considered as Least Concern.

The species *Isoaeschna isoceles* (Müller, 1767) (Fig. 5) was cited before as *Aeshna isosceles* and were recorded in May, 1910 and June, 2011 being observed in 7 localities, 6 along the Dniester River and one on the Prut River in the northern part of the Republic of Moldova (BRAUNER, 1910; DYATLOVA, 2018). In unpublished database of ANDREEV A. three specimens of this dragonfly were observed in June 1999 near the forest edges of Răscăieți locality in the Lower Dniester region.

During the study of Odonata from the Plaiul Fagului Reserve 8 specimens of *I. isoceles* were observed flying or sitting on the abundant vegetation on the pond No.2 on May 25 and 2 specimens on June 10, 2024. The species has not been cited up to date from the Plaiul Fagului Reserve. *I. isoceles* occurs in Europe, mostly around the Mediterranean, and in the lowlands of North Africa. According to IUCN Red List Category (Europe) the species considered as Least Concern.

Four specimens of *Cordulia aenea* (Linnaeus, 1758) were included in unpublished database of ANDREEV A. as being observed in June 1999 in Copanca locality, Lower Dniester region. Only one larva of *C. aenea* was cited from another locality Palanca also on Lower Dniester (BUȘMACHIU & MUNJIU, 2024). Three specimens of *C. aenea* were observed on May 25, 2024 drying their wings after hatching on the vegetation of pond No. 2 in the Plaiul Fagului Reserve. The species occurs in Europe. According to IUCN Red List Category (Europe) the species is considered as Least Concern.

The 4$^{th}$ identified species was *Sympecma fusca* (Vander Linden, 1820) which were cited before from the localities Căpriana, Chișinău, Fălești, Glodeni and Pîrlița in June and July (BEZVALI, 1932; DYATLOVA, 2010). Several specimens of *S. fusca* were observed on the vegetations around the ponds No. 2 and No. 6 in the Plaiul Fagului Reserve starting with April 16 till April 29. No specimens of the species were observed in summer. It is one of the European Odonata species that overwinter as adult insect. It can be found in all types of standing water, including in brackish waters. *S. fusca* occurs around the Mediterranean in Europe and North Africa. The species was accepted in IUCN in 2019 and is listed as Least Concern (CLAUSNITZER, 2020).

The most preferred and populated by Odonata in the Plaiul Fagului Reserve is pond No. 2 (Fig. 2) where the other Odonata species have been recorded also: *Coenagrion puella* (Linnaeus, 1758), *C. pulchellum* (Vander Linden, 1825), *Ischnura elegans* (Vander Linden, 1820), *Erythromma viridulum* (Charpentier, 1840), *Playcnemis pennipes* (Pallas, 1771), *Aeshna affinis* Vander Linden, 1820 (Fig.7), *A. mixta* Latreille, 1805 (Fig. 6), *Anax imperator* Leach, 1815, *A. parthenope* (Selys 1839), *Crocothemis erythraea* (Brullé, 1832), *Libellula depressa* (Linnaeus, 1758), *Leucorrhinia pectoralis* Charpentier, 1825, *Orthetrum albistylum* (Selys, 1848), *O. cancellatum* (Linnaeus, 1758), *Sympetrum meridionale* (Selys, 1841), *S. sanguineum* Müller, 1764, *S. vulgatum* (Linnaeus, 1758) etc.

Nowadays the number of Odonata species from the Plaiul Fagului Reserve reached 30, being more than half of the revealed in the country by BUȘMACHIU & MUNJIU (2024).

The Plaiul Fagului Reserve is one of the best protected areas with unique and rare species of dragonflies *Anax imperator* and *Leucorrhinia pectoralis* included in the Red Book of the Republic of Moldova (2015) and can be considered as a model of efficient management of natural ecosystems from our country.

## CONCLUSIONS

Investigation carried out during 2024 year in the Plaiul Fagului Reserve allow as to reveal four new species of Odonata: *Aeshna cyanea* (Müller, 1764), *Cordulia aenea* (Linnaeus, 1758), *Isoaeschna isoceles* (Müller, 1767) and *Sympecma fusca* (Vander Linden, 1820) were revealed.

Until 2024 year, only 4 main ponds were studied in this reserve, two small temporary ponds were observed and investigated recently. A small temporary pond in the forest attracted the species *Aeshna cyanea*, which was identified for the first time in the country, being the 47th species whose presence is confirmed in the Republic of Moldova.

Two protected species *Anax imperator* and *Leucorrhinia pectoralis* included in the 3th edition of the Red Book (2015) are present on the Plaiul Fagului Reserve, which is considered as a model of efficient management of natural ecosystems in our country.

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**Bușmachiu Galina**
Institute of Zoology, Moldova State University, Academiei str.1, MD 2028, Chișinău, Republic of Moldova.
E-mail: bushmakiu@yahoo.com.

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